November 2010

Energy Services BULLETIN

Western's monthly energy efficiency and renewable energy newsletter dedicated to customer activities and sharing information on energy services.

Utility helps Durango earn 'Green Power Community' honor

The Environmental Protection Agency (EPA) recently recognized the community of Durango, Colo., as a "Green Power Community" for its collective commitment to purchase renewable energy through La Plata Electric Association (LPEA).

The state's only Green Power Community ranks eighth in the United States in the percent of green power that makes up the city's total power consumption, and 13th in overall green power use. "That's pretty impressive for a city the size of Durango," noted Mark Williams, the city's sustainability manager.

EPA Green Power Communities are municipalities in which the local government, businesses and residents voluntarily purchase green power, or electricity generated from a renewable resource such as solar, wind, biomass or small hydro, in amounts that meet or exceed EPA's Green Power Community requirements.

The 20-kW photovoltaic system on the Durango Discovery Museum is part of the city's efforts to "green" its operations. (Photo by City of Durango)

Big accomplishment

In 2009, Durango residents and businesses purchased in excess of 12,758,000 kilowatt hours (kWh) of green power from LPEA, accounting for 7.3 percent of all electricity consumed within the city. That is more than double EPA's 3 percent standard for communities like Durango that use less than 100,000,000 kWh annually.

According to EPA calculations, Durango's cumulative green power kilowatt hour (kWh) purchase avoided carbon dioxide emissions of an estimated 9,362 metric tons, equivalent to the annual emissions from 1,790 passenger vehicles.

"This recognition shows that Durango is among a short list of communities from across the country that has made a significant contribution to minimize their impact on the environment," said Greg Caton, Durango assistant city manager, noting that the EPA sent street signs announcing the recognition. "The city of Durango continues to purchase green power for the library, transit center and water and wastewater treatment plants, but to qualify as an EPA Green Power Community it has taken the commitment of individuals and businesses throughout Durango."

"This recognition is well deserved for the Durango community," added Mark Schwantes, LPEA manager of corporate services. "This demonstrates the commitment of the residents of the city of Durango to 'offset' their electric use with clean, renewable wind power from LPEA."

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What's inside

Durango honored

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Utility support

The electric cooperative has offered a green power option to its 30,000 members for more than a decade. Durango residents earned their 'Green Power Community' standing purchasing renewable energy certificates (RECs)—mostly from wind—at a monthly premium of 80 cents per 100-kW block. This year, LPEA dropped the price to 10 cents per block with help from its power wholesaler Tri-State Generation and Transmission.

"The idea has always been that if enough people pay a premium for renewable generation, the price of the RECs will eventually come down, and that's what happened," said Schwantes. "Durango now gets about 11 percent of its power in the form of wind RECs, and about 25 percent of the RECs Tri-State sells are purchased by LPEA."

Schwantes attributed the success of LPEA's green power program to early leadership from the city of Durango, as well as local environmental organizations who urged LPEA and Tri-State to adopt ambitious goals for renewable energy. "But most importantly, our board and management's support for the effort—and our members' voluntary purchase of green power—has made all the difference," he said.

Local generation

In addition to continuing their support of LPEA's green power program, Durango residents have also installed 57 solar systems. The city, too, does its part to "green" municipal operations. A 45-kW cogeneration system at the wastewater plant captures methane and heat to meet a sizeable portion of the plant's power needs. A new solar thermal water heating system on top of Durango's recreation center will help reduce the heating demand from the swimming pools, the city's biggest energy users.

LPEA is raising more funding for renewable energy projects with the popular Just One Block campaign. Initially, one half of the revenue from each member purchase of green power blocks went toward developing new renewable generation.

In its previous iteration, the program brought in enough money from people who just wanted to support clean energy to pay for photovoltaic systems on two schools, said Schwantes. "Our consumers were really excited to be able to point out the installations to their kids and say, 'I helped make that happen,'" he recalled.

The latest version of Just One Block allows members to choose to contribute their premium either to Tri-State's wind projects or to local renewable generation projects. Currently, 1,900 LPEA customers subscribe to the wind power program and 1,800 support local projects.

New opportunities

That means the co-op will be able to develop more renewable generation, but with a different focus, Schwantes said. "Thanks to state and Federal rebates available today, we see more businesses and consumers just installing systems on their own," he explained. "So we'll still talk to schools, but now we're looking at projects that fill in the gaps."

Community solar gardens, for example, could give consumers who don't have enough roof space or money the opportunity to own part of a solar system. LPEA is evaluating a few potential sites on city and Federal land.

One Federal project that interests Williams is a proposed 4-MW solar installation on a mitigated uranium tailings site. "DOE is performing an environmental assessment on the site," he said. "That project would be a huge addition to Durango's portfolio."

LPEA also counted two or three wind turbines and two micro-hydro generators among the projects it connected and net metered this year. As Williams asserted, Durango and the rest of the territory La Plata Electric Association serves are at the beginning of an era. "With all these different resources coming online, who knows where we will be in five years," he said.

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Clean Energy Ambassadors — A new source of experience

Clean Energy Ambassadors (CEA) is a new program based on an old idea that still works—that is, "Experience is the best teacher."

CEA is geared to help municipal utilities and electric cooperatives in a region roughly matching Western's territory to enhance energy efficiency and renewable energy efforts. The CEA program, which is funded by the Energy Foundation and administered by non-profit Plains Justice, has focused on sharing the solutions that some utilities have found in their planning and program implementation work.

Members of the Rosebud Sioux tribe use straw bales to build more energy-efficient houses. Cherry-Todd Electric Cooperative, the tribe's power supplier is working with consumers to reduce energy bills. (Photo by Jill Cliburn, Clean Energy Ambassadors)

Old pros, new scenario

It is no surprise that the lead Clean Energy Ambassadors themselves had plenty of direct experience in this field. Glenn Cannon, the first Clean Energy Ambassador, was former general manager from Waverly, Iowa, Light and Power and an American Public Power Association (APPA) leader. Jill Kunka Cliburn earned her stripes in the utility industry and working, years ago, for Western's Energy Services Program.

According to Cliburn, "My own experience proved to me that peer-to-peer advice and a good success story are more useful than a textbook discussion of how to start any utility program."

But this is not the Energy Services Peer Match program of old. Cliburn said technologies have greatly improved, our understanding of utility economics has improved and utility capabilities are stronger than ever. At the same time, one big new problem has cropped up: staff-time is stretched thin nowadays, even as demand-side strategies remain labor intensive.

Local involvement

CEA offers a common sense solution. That is, to weave more public involvement into the program plan. "This is a challenge to community groups, possibly more than it is a challenge to the utility," Cliburn said.

CEA asks locals, from energy-interest groups to civic groups, youth groups and clubs, to find out what their consumer owned utility has to offer, and to help their programs succeed. Cliburn points to communities like Fowler, Colo., or Wayne, Neb., where being energy-efficient is becoming a source of community pride. Utilities and local governments still need to provide the expertise and leadership, but their energy efficiency programs succeed because of "people power."

Small co-op seeks help

One example of CEA's efforts was a recent visit that Cliburn made to work with Cherry-Todd Electric Cooperative and the Rosebud Sioux community that comprises much of its customer base. On a quick drive-by, Cherry-Todd, in Mission, S.D., seems the same as it has always been—a small utility, with about 6,000 customer meters spread across ranchland and Rosebud Sioux tribal communities.

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Roseville school program creates junior energy consultants

Educating children about energy use is a great way to educate their parents, and you can extend the outreach even further by going through the classroom, as the city of Roseville, Calif., did with its LivingWise Program for Schools.

LivingWise provides teachers with classroom materials and take-home kits for each student, containing CFLs, low-flow showerheads, kitchen aerators and other easy-to-install items. After learning about conservation in the classroom, students are assigned to share savings tips with family members and install the energy- and water-saving measures in their homes.

Roseville's Environmental Utilities is projecting that the program will annually save 4,248,428 gallons of water and waste water; 135,669 kilowatt hours (kWh) of electricity, and 7,927 therms of gas. The reductions in water and energy use will continue for years to come, along with the strong ties the program builds with the community—not to mention the responsible energy habits students learn.

Classroom, home learning

Each fall, middle schools throughout Roseville's territory receive an e-mail offering sixth-grade classes the LivingWise curriculum. In 2009, 664 sixth-grade students from Cooley Middle School, Sargeant Elementary School, St. Albans Country Day School, St. John's School and Silverado Middle School participated.

Before instruction begins, the students take a 10-question test about energy use. The average test score of 2009 participants was 77 percent.

The program features classroom discussions teaching the importance of using water and energy efficiently, followed by hands-on, creative problem solving. Next, participants receive their Resource Action Kits containing simple, inexpensive conservation tools and record keeping materials.

With the help of their parents, students install the measures in their home and complete a home survey. In addition to asking students which measures they adopt, the survey also collects data about size and age of the home, number of occupants, number of bathrooms and types of heating and cooling systems and appliances.

The LivingWise take-home kit contains low-cost measures students can easily install with the help of their parents. (Photo by Resource Action Program)

Participation teaches

Reporting is a critical part of the LivingWise curriculum, not only for the data it provides Roseville, but because it boosts participation. The teachers received 565 Household Report Cards from the 664 given out with the kits—an 85-percent participation rate. Any utility that has ever designed and managed an energy-efficiency program is bound to be impressed by those results.

Customer satisfaction with the program was also very high. In evaluating LivingWise, students, teachers and parents all gave the program very high marks. All of the participating teachers indicated that parents supported the program, and that they would recommend this program to other colleagues. Even the toughest audience for an educational program (that's the students) approved of the curriculum by a majority of 65 percent. Just as important, when the students took the same energy test they had taken before the program, scores and subject knowledge improved to an average of 85 percent.

Ready for classroom

The city has been offering the LivingWise curriculum to sixth-grade teachers since 2000. "We learned about it while attending the Utility Energy Forum," explained Roseville Public Relations Manager Vonette McCauley. "The fact that it is a turnkey program made it easy for us to implement."

Resource Action Programs (RAP), Roseville's partner for 16 years in developing consumer education programs, created LivingWise. The nonprofit energy education firm provides municipalities, utilities, states, community agencies and corporations with all aspects of program design and implementation. RAP specializes in

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ask the energy experts

Comparing retrofit rooftop coolers

Question:

Please provide us with some information about these two potential retrofits for rooftop HVAC units:

- Evaporative-assisted condenser pre-cooling
- Improved seals for low-leakage outside air (OSA) dampers

Answer:

Let's address each technology separately.

Evaporative condensers

Evaporative pre-cooling can reduce the cost of air conditioning up to 50 percent or more in dry climates. These savings come from reducing the "thermal lift," i.e., the difference between the evaporator and condenser temperatures. In Spokane, Wash., with summer dry bulb (DB)/ wet bulb (WB) temperatures of 97/65, an evaporative cooler can reduce condensing temperatures almost 30°F more than an air-cooled condenser—even more if the air supply stream to the condenser comes from a hot roof or parking lot.

Efficiency Vermont has a presentation that explains the advantages of evaporative cooling (1.62 MB pdf) in non-technical terms. "Performance Enhancement of Existing Air Conditioning Systems," by G. D. Mathur, describes the simulation analysis of an older SEER 8.0 rooftop unit retrofitted with a two-phase, natural-circulation, heat-recovery loop and an evaporatively-cooled condenser.

The downside of evaporative condensers is that they consume water and require regular maintenance, which air-cooled condensers do not (a huge advantage in residential and other small installations). As the name implies, evaporative cooling systems lose water through evaporation, which helps to cool the remaining water. The system adds make-up water to maintain its required water inventory.

Also, evaporating water leaves dissolved minerals behind, so that as more water evaporates, the concentration of dissolved solids in the remaining water increases. Eventually, the concentration of dissolved solids exceeds the saturation level and begins to precipitate out of the water solution, depositing scale on the heat exchange surfaces of the evaporative cooling system. Scaling on heat transfer surfaces decreases the rate of heat transfer. The loss of heat-transfer efficiency not only increases operating costs, but also leads to deterioration of equipment.

There are several ways to control scale and bio-fouling. One common measure is adding a drain-valve in the sump that allows mineral-laden sump water to "bleed-off" when the unit is operating. As water drains slowly from the sump, new make-up water enters, reducing the concentration of dissolved solids below the saturation level. This effectively inhibits scale formation, but increases the use of water and chemicals. It is also not always reliable—small pieces of scale or other sump debris can clog the valve, leading to major scaling on the condenser. Some large units have a dissolved solids measuring device to control the flow of water out of the sump. These units admit make-up water only as required.

A flexible heat-exchange surface is another way to prevent scaling. The movement during normal operation is enough to crack off any scale accumulation. One retrofit condenser uses a cone-shaped loop of copper tubing supported above the bottom of the sump. During operation, temperature variations and pulsing pressure from the compressor move the copper piping just enough to crack off scale. Of course, someone has to remove the scale, or it will accumulate and cover the coils.

Chemicals can also be used to control scale and bio-fouling. These are often strong acids or chromium-based solutions that are highly toxic and require careful handling. Usually, a small pump delivers the chemicals to the sump in a calibrated quantity based on the amount of make-up water. Using ozone to control bio-fouling has a couple of advantages over chemical treatments. First, it can be manufactured locally at low cost using only the oxygen in the air and electrical energy. Secondly, it dissipates with little risk of environmental damage.

Several types of evaporative condensers are aimed at the retrofit market. PowerCold Company offers a variety of evaporative equipment, including evaporative fluid coolers and condensers. Thermal-Flow sells residential and commercial evaporative condensers, cooling towers and complete water-cooled air conditioners.

For a different approach, check out water cooled evaporative air

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Website of the month:

Clean Energy Ambassadors webinar series

In a departure from this column's usual practice of profiling established websites, this month Energy Services Bulletin is calling on readers to help create a Web resource—Clean Energy Ambassadors—and to participate in a webinar series.

For utilities – mostly

Although anyone with an interest can participate, this new online community targets public power providers, especially the smallest utilities, said Carrie La Seur, president of Plains Justice, which administers CEA. "The ones who are just struggling to keep the lights on," she explained. "Those are the ones that need some extra help but have the fewest resources to get it."

Visitors can find such help in blog posts, news items and videos where members share their activities, experience and information resources. The forum gives members a place to hold a dialogue on specific topics. Issues are grouped broadly in three categories: Utilities, Community Groups and Technology News and Info. Anyone can read the discussions, but you must be a member to contribute.

CEA has been live for less than a year, so it is still evolving, La Seur explained. "We would like to see it become a resource where consumer-owned utilities with limited capacity to develop energy services can connect with experts who can provide focused solutions," she said. "Even with the best intentions, the one-person municipal utility doesn't have time for research and program design."

Free education

In keeping with that goal, Low Cost/No Cost Energy Savers, the first webinar in CEA's lunchtime series, is highlighting energy-saving measures that give consumers the biggest bang for their buck. On Nov. 16, from 11:00 a.m. to noon MT, speakers from municipalities will compare give-away programs, direct installs and strategies to boost customer follow-through. "We chose this subject based on very specific requests from members whose consumers need to lower their utility bills," said Jill Cliburn, a frequent CEA blogger and forum contributor.

The series will continue on the third Tuesday of each month through April. The webinars will begin with a half-hour presentation followed by a question-and-answer session. Future webinar topics include:

- Infrared Cameras: The Utility How and Why – Dec. 20
- Utility Help for Non-English Speakers – Jan. 18, 2011
- Which Energy Audit Strategy Suits Your Needs – Feb. 15
- Energy Efficiency Tips for Small Businesses – March 15
- Schools: A Top Choice for Energy Savings and Outreach – April 19

Western's own Ron Horstman is among the presenters from different facets of the utility industry who will offer insights, examples and lessons learned from years of designing and implementing energy services programs.

Free registration will be available on the CEA site, and while you're there, join the Clean Energy Ambassadors. Bookmark the page and check back often. Share your resources and see what other utilities have to say about issues that affect the entire industry. You never know when you might meet someone who has a problem just like yours—or the answer you have been seeking.

Want to know more?
Visit www.wapa.gov/es/pubs/esb/2010/nov/nov105.htm

Energy ambassadors

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Yet, Cherry-Todd has recently started to reinvent itself from the inside out, with vision, services and technologies for the 21st Century. One major driver for this slow, but sure change is the Rosebud Sioux community, and its member-owners of the electric co-op.

The Intertribal Council on Utility Policy (COUP), which works in the region, made the initial contact with the utility and invited CEA. Cliburn went to work with the Cherry-Todd board, staff and Tribal community members on the difficult question of how to lower customer bills through energy efficiency and load control.

Energy efficiency first

This fall, the co-op will be installing new electronic meters, which will allow automatic meter reading and support load control on electric water heaters. Eventually, the meters could support other types of load control and provide detailed information on customer energy use. But in a co-op where more than 8 percent of customers are seriously behind on their bills, leaders are right to wonder whether more basic steps should come with the high-tech solutions.

For Cherry-Todd General Manager Tim Grablander, it was easy to see how to customize some of the case studies and tips Cliburn brought from other utilities. For example, she had updated advice on using low-cost/no-cost energy savers kits, long proven to help customers to save 5 to 25 percent on energy bills, even before adding bill credits from any kind of load control. The co-op might also consider timing the installation of load control with an offer to directly install some CFLs or water heater blankets.

Marketing challenges

But in Mission, program marketing could be tough. The relationships among different agencies and even among family members are key to implementing basic home weatherization and appliance-related measures. For example, some families have to work with the tribal housing authority on basic home repairs. Some look to the Low-Income Home Energy Assistance Program (LIHEAP) for help with bills and some types of weatherization.

Grablander decided to start coordinating outreach efforts, so other outreach agencies would be first to know about new co-op offers, and so customers would hear the same message in any given month from a variety of sources. And most important, a tribal energy expert could help to coordinate efforts by different organizations. For example, a new graduate of United Tribal Technical College in Bismarck, Leo Campbell, recently joined the Tribal Housing Authority and has offered his services to help identify and fix housing energy problems.

Change happens

The changes in any distressed co-op like Cherry-Todd are likely to be gradual, but Grablander says he's seen more signs of positive changes lately than he has for a long time, and many tribal members agree.

Some positive signs have to do with the availability of useful new technologies, but more have to do with the participation of local people who have strong ideas and strong commitment. For example, last year Cherry-Todd welcomed tribal members Rod Bordeaux and Whitney Meeks to the co-op board of directors for the first time in history. The co-op has begun to build stronger communications with the Tribal Energy Commission, Sinte Gleska University, tribal housing authority, energy assistance program, and many others. The CEA program will pass along more advice as its able, and the Ambassadors hope to call folks in Mission again—to share the story of their hard-won success.

Check out the Energy Ambassadors website, or contact Jill K. Cliburn to find out how Clean Energy Ambassadors can help your utility.

Want to know more?
Visit www.wapa.gov/es/pubs/esb/2010/nov/nov102.htm

Energy experts

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conditioning, which can produce EERs between 20 and 17. Premier Industries' line of evaporative pre-coolers use a 12 inch-thick rigid paper evaporative pad that can humidify air to 90 percent saturation with air velocities of 500 feet per minute. These pads are used in condenser pre-coolers, evaporative coolers, heater/cooler units, make-up air units and more.

Low-leakage damper seals

Less information is available on damper seals from academic, professional, internet or other public sources. It may be that manufacturers who have developed new innovations in low-leakage damper seal technology closely guard their inventions to enhance their companies' profits.

The Bubble-tight damper, a type of positive seal damper, is classified by American National Standards Institute/American Society of Mechanical Engineers AG-1 as "no leakage" at its maximum design operating pressure. While a no-leakage damper is technically possible, it is not yet practical on an HVAC outside air (OSA) damper. OSA control dampers must be selected carefully to insure velocities high enough to get good mixing without excessive pressure drop. Portland Energy Conservation Inc. publishes a guide on selecting and sizing dampers for OSA coolers and economizers (section 3.6.1.2).

Advanced Automated HVAC Fault Detection and Diagnostics Commercialization Program is a study on the costs and benefits of low-leakage dampers, funded by Public Interest Energy Research (PIER). Researchers looked at several energy improvements and other innovations incorporated in the Carrier Model 48PG Advanced Rooftop Unit (ARTU). The cost of the dampers is included in the unit. However, the data showed that the published leakage rates for the dampers, given in units of "percent leakage," do not match the American Society of Heating, Refrigerating and Air-conditioning Engineers (ASHRAE) damper leakage criteria (cfm per sq.ft. of damper area). Applying blade seals to the 48PG unit did little to reduce damper leakage.

The study concluded that the dampers offered minimal energy savings. Damper leakage affected system performance mostly during economizer operation, when the return air damper is completely closed. Leakage through the return air damper raised the mixed air temperature, reducing the amount of cooling provided during economizer operation.

Want to know more?
Visit www.wapa.gov/es/pubs/esb/2010/nov/nov104.htm

School program

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programs that combine education with hands-on activities, a very effective method for teaching kids about conservation and energy efficiency.

LivingWise delivers Roseville's message about preserving natural resources through energy efficiency, water conservation and renewable energy in a way that teachers can use. The curriculum supports California State Content Standards for sixth grade science by illustrating the concept that energy can be carried from one place to another by heat flow or by waves, including water, light and sound waves, or by moving objects. It also integrates California State Content Standards for sixth grade mathematics, requiring students to demonstrate an understanding that rate is a measure of one quantity per unit value of another quantity.

Education pays off

Roseville shares the cost of LivingWise with its municipal utility using funds from California's Public Benefits Program to support it. Although the city tracks the savings from the school program—and those are significant—it does not calculate the payback on its investment. "We consider it an education program so we don't evaluate it in the same way we would an equipment rebate, for example," said McCauley.

Even so, the program has delivered long-term savings, consumer behavior change—and a lot of brightly illustrated thank-you notes from sixth-graders. That is a return on investment that any utility can be proud of.

Want to know more?
Visit www.wapa.gov/es/pubs/esb/2010/nov/nov103.htm